Patent Claims

1. A rotational speed sensor having a vibrating gyroscope which is part of a primary control loop and of a secondary control loop, where the control loops respectively amplify an output signal from the vibrating gyroscope, demodulate it, remodulate it and supply it back to the vibrating gyroscope as excitation signal, and where the primary control loop provides the predominant part of the energy for maintaining the vibration, characterized in that there is, for the purpose of producing carriers which are used for demodulation and for remodulation, a frequency synthesizer (10) having means for setting the phases of the carriers in relation to one another, and in that the frequency synthesizer (10) and a phase comparison circuit (44) together form a phase locked loop (10, 44, 46, 47), the phase comparison circuit (44) being able to be supplied with the amplified output signal in the primary control loop (6) and with a comparative carrier produced by the frequency synthesizer (10).

2. The rotational speed sensor as claimed in claim 1, characterized in that a first carrier can be supplied to a synchronous demodulator (45) in the primary control loop (6) and a second carrier can be supplied to a modulator (51) in the primary control loop (6).

3. The rotational speed sensor as claimed in claim 2, characterized in that when the phase locked loop (10, 44, 46, 47) is locked the phase of the second carrier is chosen such that the phase rotation of the total primary control loop (6), including the vibrating gyroscope (1), meets the resonance condition.

4. The rotational speed sensor as claimed in claim 3, characterized in that additionally the phase of the first carrier

corresponds to that of the amplified output signal in the primary control loop (6).

5. The rotational speed sensor as claimed in one of claims 2 to 4, characterized in that a third and a fourth carrier are phase shifted through 90° with respect to one another and can be supplied to a respective synchronous demodulator (28, 29) in a first and in a second path of the secondary control loop (7), and in that a fifth and a sixth carrier are phase shifted through 90° with respect to one another and can be supplied to a respective modulator (35, 36) in the first and second paths.

6. The rotational speed sensor as claimed in claim 5, characterized in that when the phase locked loop (10, 44, 46, 47) is locked the difference between the phases of the third and fourth carriers and the phases of the fifth and sixth carriers is chosen such that the resonance condition is met in the secondary control loop (7), and in that the phases of the third to sixth carriers are chosen with respect to the comparative carrier such that a rotational speed signal which can be picked off from the synchronous demodulator (28) in the first path via a filter (30) adopts a maximum for a given rotation of the vibrating gyroscope (1).

7. The rotational speed sensor as claimed in one of the preceding claims, characterized in that a nonvolatile memory (11) is provided for phase values stipulated in a previous trimming process, from which memory the values can be read and supplied to the frequency synthesizer (10) when the rotational speed sensor is turned on.

8. The rotational speed sensor as claimed in claim 7, characterized in that temperature-dependent phase correction of the carriers is performed.

9. The rotational speed sensor as claimed in claim 8, characterized in that temperature-dependent phase correction is performed using a change in the oscillation frequency of the vibrating gyroscope (1) as a measure of the temperature change.

10. The rotational speed sensor as claimed in either of claims 8 and 9, characterized in that the nonvolatile memory (11) stores temperature dependencies.

11. A method for trimming a rotational speed sensor having a vibrating gyroscope which is part of a primary control loop and of a secondary control loop, where the control loops respectively amplify an output signal from the vibrating gyroscope, demodulate it, remodulate it and supply it back to the vibrating gyroscope as excitation signal, and where the primary control loop provides the predominant part of the energy for maintaining the vibration, where there is, for the purpose of producing carriers which are used for demodulation and for remodulation, a frequency synthesizer having means for setting the phases of the carriers in relation to one another, where the frequency synthesizer and a phase comparison circuit together form a phase locked loop, and where the phase comparison circuit may also be supplied with the amplified output signal in the primary control loop and with a comparative carrier produced by the frequency synthesizer, characterized

- in that the phase of a carrier for a modulator in the primary control loop is set to meet a resonance condition in the primary control loop,
- in that after that the phase of two carriers which are phase shifted through 90° with

respect to one another for synchronous demodulators in the secondary control loop is set in relation to the phase of two further carriers which are phase shifted through 90° with respect to one another for modulators

in the secondary control loop in order to attain a resonance condition in the secondary control loop, and

- in that when the vibrating gyroscope is set in rotation the phases of the carriers for the synchronous demodulators and for the modulators in the secondary control loop are then adjusted in the same sense in relation to the comparative carrier such that the rotational speed signal is at a maximum.